 **UNIVERSITY OF MAINE AT FARMINGTON**

**COLLEGE OF EDUCATION, HEALTH AND REHABILITATION**

**LESSON PLAN FORMAT**

**Teacher’s Name:** Kiera Timme **Lesson #:** 6 **Facet:** Organize  
**Grade Level: Grade 8 Numbers of Days:** 3

**Topic:** Analyzing Data with Scientific Notation  
  
**PART I:**  
  
**Objectives**  
Student will understand that scientific notation has real-world applications  
Student will know real world applications, data analysis  
Student will be able to analyze data that contains scientific notation   
  
**Product:** Prezi  
  
**Common Core State Standards**  
**Content Area:** Mathematics  
**Grade Level:** Grade 8  
**Domain:** *Expressions and Equations*  
**Cluster:** *Work with radicals and integer exponents.*  
**Standard:** *Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.*  
  
**Rationale:** In this class students will research and analyze data which they will convert into scientific notation while also choosing appropriate units for measurements  
  
**Assessments**   
  
**Formative (Assessment for Learning)**  
**Section I – checking for understanding during instruction**  
Students will use their math journals to reflect upon the material discussed in class. Students will also participate in the "inside/outside" and "Give One, Get One" activities where they will share and compare ideas, and information, with their fellow classmates. I will also review the students ISP chart to check for understanding.  
  
**Section II – timely feedback for products (self, peer, teacher)**  
Journals will be collected by me and written feedback will be provided. A checklist will be provided to help students create their product and ensure they have included all the necessary criteria. I will review the organizers with the checklist and provide feedback. I will review the Prezi products electronically and then use the same checklist to provide students with feedback. Students will be given the opportunity to use the teacher feedback to make any necessary adjustments.  
  
**Summative (Assessment of Learning):**  
Students will use Google Earth to find population statistics and other information about two different countries. They will then use this information to create a Prezi presentation that compares and contrasts the two countries data. This comparison must include an analysis of the statistical data about two countries. For example: how many times bigger the population (or other figure) of one country is than the other? (Checklist will detail exact specification. Students will use their graphic organizers to collect information about their assigned counties to help them create their product. Students must cite their sources.  
  
**Integration**  
**Technology:**   
Students will use *Prezi* to create a presentation which compares and contrasts information about two different countries. This product will also provide students with an opportunity utilize a powerful online presentation tool, while also applying their knowledge of scientific notation to real world information.  
  
**Content Areas:**   
*English/Language Arts* - Students will be writing in reflective journals (on-going). Since they are creating a Prezi presentation, student work will have a written component. They will also be required to a works cited list as part of their product.  
*Art (New Media*) - Students will have creative control of the overall aesthetic of their product, which must include images, videos, and audio.  
*Social Studies* - Students will be researching and comparing information about two different countries.  
  
**Groupings**   
**Section I - Graphic Organizer & Cooperative Learning used during instruction**  
Students will use ISP charts to organize the data they gather from Google Earth about their randomly assigned countries. While students are researching countries, they will use the "Give one, Get one" activity as a way to share ideas and helpful tips they have about Google Earth. Students will also participate in the "inside/outside" activity to share the information they found about their country with their classmates.  
  
**Section II – Groups and Roles for Product**  
Students will pair up with a partner who has researched a different country to create their Prezi presentations. Together they will, using the ISP charts, analyze the data, ensuring all information if presented in both standard and scientific notation. They must also ensure that they have used appropriate measurements and units, and that they have correctly cited their sources.  
  
**Differentiated Instruction**  
  
**MI Strategies**  
  
**Verbal:** When creating their Prezis students must provide written information about the country they are researching, and carefully cite any sources used.  
**Logic:** Students will be using their knowledge of scientific notation and relating to the real world.  
**Visual:** Students will be given the opportunity to explore the "scale of the universe" hook. This in an interactive model with tons of visuals with the size of each object expressed in scientific notation.  
**Kinesthetic:** The "Give One, Get One" activity provides students with the opportunity to move around the class and ask questions with purpose.  
**Interpersonal:** Students will work in teams to compare and contrast their countries. After which they must work to create their Prezi.  
**Intrapersonal:** Students will initially work independently to find the required information about their assigned  
**Naturalistic:** Students will be given the opportunity to explore the "scale of the universe" hook. This model includes many animals and plant life with their sizes in scientific notation. For the Prezi students must find data about the countries national animal, flower, or other natural treasure.  
  
  
**Modifications/Accommodations**  
***From IEP’s ( Individual Education Plan), 504’s, ELLIDEP (English Language Learning Instructional Delivery Education Plan)*** *I will review student’s IEP, 504 or ELLIDEP and make appropriate modifications and accommodations.*  
  
**Plan for accommodating absent students:**  
The class will have its own Wiki website. All handouts and assignments will be posted on the class wiki. At the end of the class period any SmartBoard presentations will also be uploaded onto the wiki. All students will also be provided with links to video tutorial to review the content being taught. Anytime a new technology in introduced a student/teacher created screencast or manufacturer tutorial will be posted into the class wiki as a guide on how to use this technology.  
  
**Extensions**  
  
**Type II technology:**  
Students will use *Prezi* to create a presentation which compares and contrasts information about two different countries. This product will also provide students with an opportunity utilize a powerful online presentation tool, while also applying their knowledge of scientific notation to real world information.  
  
**Gifted Students:**  
As part of the homework assignment students will be given a menu of problem choices which will review all the material from this unit. From this menu, every student will choose six entrees and a choice of four problems from the starters and desserts. These problems will be tiered. Entrees will be designed to meet the standard, Starters will be for designed for students who are working towards the standard, and Dessert will be designed to exceed the standard as a form of extension. Students will also be provided with links to additional websites which provide statistical data, providing gifted students with an opportunity to develop their researching skills.  
  
**Materials, Resources and Technology**  
*List all the items you need for the lesson.*

* My laptop
* Student laptop
* SmartBoard (sign-up for this)
* ISP Chart
* Prezi tutorial link/screencast
* Google Earth tutorial
* Whiteboard
* Whiteboard markers
* Updated class wiki
* Unit Conversion Chart on class wiki
* Checklist
* Handout regarding citing sources
* Link to information about citing sources
* Student product contribution self-evaluation (GoogleForm)
* Textbook
* Problems menu (posted onto class wiki)
* Calculator

**Source for Lesson Plan and Research**  
*List all URL and describe.*  
**Hook - Scale of the Universe**  
<http://htwins.net/scale2/>  
**Prezi Tutorial:**  
<http://prezi.com/learn/>  
**Google Earth Tutorial:**  
<http://www.google.com/earth/learn/beginner.html>  
**Measurement Conversion Chart (English to Metric):**

<http://www.abcteach.com/free/m/metric_conversions.pdf>

**Khan Academy - Scientific Notation Review:**  
**PART 1 -** <http://www.youtube.com/watch?v=kSx873lOgIc>  
**PART 2 -** <http://www.youtube.com/watch?v=vDfd0bj3mo0>  
**GoogleForm:**  
linked to class wiki (www.wikispaces.com)  
**Class wiki:**  
www.wikispaces.com  
**Citing Sources guide - Owl Purdue Writing Resources:**  
<http://owl.english.purdue.edu/owl/resource/589/01/>  
**Creative Commons website:**  
<http://search.creativecommons.org/>  
**Extension - Additional Resources:**  
*CIA Country Info*: <https://www.cia.gov/library/publications/the-world-factbook/>  
*UNICEF*: <http://www.unicef.org/statistics/index_countrystats.html>  
  
**PART II:**  
  
**Teaching and Learning Sequence (Describe the teaching and learning process using all of the information from part I of the lesson plan)** *Take all the components and synthesize into a script of what you are doing as the teacher and what the learners are doing throughout the lesson. Need to use all the WHERETO’s. (3-5 pages)*  
  
**Agenda:**  
  
Day One (80 minutes):

* Attendance (3 minutes)
* Hook (10 minutes)
* SmartBoard Lecture & Group Discussion about measurements and appropriate units (20 minutes)
* Unit Material Review - Group Discussion (30 minutes)
* Google Earth Discovery (12 minutes)
* Journal (5 minutes)

Assignment: Watch Prezi tutorial & set-up Prezi account. Complete 10 mixed review problems from the problems menu. This menu contains the material from this entire unit. Students will choose six entrees and a choice of four problems from the starters and desserts.  
  
Day Two (80 minutes):

* Attendance (3 minutes)
* HW/ Student Q&A (20 minutes)
* Country assignment activity (5 minutes)
* ISP Chart & Research - Including "Give One, Get One" activity (47 minutes)
* Journal (5 minutes)

Assignment: Complete ISP Chart with country information (if incomplete). Be prepared to begin partner work next lesson  
  
Day Three (80 minutes):

* Attendance (3 minutes)
* Student Q&A (15 minutes)
* Inside Outside Activity (15 minutes)
* Assign Partners (5 minutes)
* Create Prezi (42 minutes)

Assignment: Work with partner to complete Prezi product. Once Prezi is complete, post a link to your presentation on to the class wiki.  
  
Students will understand that scientific notation has real-world applications. Certain occupations depend on scientific notation in order to be effective at their job. Astronomers calculate the distance between planets and stars, some of which wouldn't even fit on a calculator screen, or a A4 page. *Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g.use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.* The "[Scale of the Universe](http://htwins.net/scale2/)" hook is a way for students to explore and appreciate how relevant scientific notation is to the real world. This activity gives students an opportunity to discover the scale of life forms, plants, and objects in our universe from the microscopic to the colossal.  
**Where, Why, What, Hook Tailors:** Visual, Logical, Naturalistic  
  
Students will know real world applications, and how to analyze data (*see content notes*). We will begin by having a lecture and class discussion during which we will discuss choosing appropriate units of measurement when converting standard notation into scientific notation. We will then take time to discuss the material from the rest of the unit as the following activity incorporates prior and new learning. The remainder of the first day will be dedicated to exploring Google Earth. At the beginning of the second day, students will be given their country assignments. These will be determined by a drawing a name from a hat. Each country will have two students assigned to them, but the students will research them independently. Once students know their assigned country they will begin finding the information, outlined in the checklist, about that country and putting the details into their ISP charts. Half way through their researching, students will participate in the "Give one, Get one" activity, with the student who is researching the same country, to exchange ideas. Students will then reflect on the lesson, and summarizing their understanding, by writing in their journals.  
**Equip, Explore, Rethink, Tailors:** Verbal, Logic, Visual, Interpersonal, Intrapersonal, Naturalistic, Kinesthetic  
  
Students will be able to analyze data that contains scientific notation. During the third day, students will be given time to work with their partner on their Prezi product. Students will be paired up with a partner who has researched a different country to them. They will each use the information they gathered to create a Prezi presentation that compares and contrasts the two countries data. This comparison must include an analysis of the statistical data about two countries. For example: how many times bigger the population (or other figure) of one country is than the other? Students will be provided with a checklist which will detail the exact specifications for their product. During class, while students are creating their products, I will provide feedback regarding the graphic organizer as well as on their Prezi products at that point.  
**Explore, Experience, Rethink, Revise, Refine, Tailors:** Interpersonal, Intrapersonal, Verbal, Logical, Visual, Musical, Naturalistic  
  
Students will use their journal entries, graphic organizers and a checklist to help create and self-assess their products. Students will also have an additional opportunity to make adjustments based on peer feedback. I will review their show me products electronically and then use the same checklist to provide feedback so they can make adjustments before the final grading is completed. In order to indicate that they are ready for the products to be assessed, students will post a link to their blog onto the class wiki. The homework assignments are designed to provide students with an opportunity to better acquaint them with the technology we will be using in a risk-free way, and as a way to begin thinking about what elements make for an effective Prezi presentation.  
**Evaluate, Tailors:** Verbal, Visual, Interpersonal, Intrapersonal, Logical  
  
**Content Notes**   
Students will know…..   
*Definitions:*

* Choosing Appropriate units
* Measurement Conversions

See attachment for complete content notes  
  
**Handouts**  
*List the items that need to be printed out for the lesson.*  
*ISP Chart*

*Measurement Conversion Chart*  
  
**Maine Common Core Teaching Standards for Initial Teacher Certification and Rationale**  
  
***Standard 1 – Learner Development. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.***  
  
  
***Learning Styles***  
  
***Clipboard:*** This lesson is structured to incorporate sequential learning with clear procedures on how to master the content. Lesson expectations are clearly outlined both during the lesson and on the class wiki.  
  
***Microscope:*** This lesson allows for student self-discovery of the content. Students are encouraged to discuss the content with their peers, and to develop a sense of ownership of the material. This is facilitated during the group discussion of the learning, and when students research their own information data, and compare and share their solutions with their partner.  
  
***Puppy:*** At all times every effort will be made to ensure a positive and encouraging learning environment. During group discussion, students will be encouraged (and required) to actively listen to their peer comments.   
  
***Beach Ball:*** The problems menu provides students with a choice in the problems they solve. Students will also have the opportunity to do their research using other, more complex, resources as a form of extension. The problem menus also provide opportunities for extension.   
  
***Rationale:*** This lesson is designed to review and reinforce the material discussed in throughout this unit lessons, while also introducing new material in an engaging and meaningful way for all learning styles.  
  
  
***Standard 6 -* *Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their on growth, to monitor learner progress, and to guide the teacher's and learner's decision making.***  
  
***Formative:*** Students will use their math journals to reflect upon the material discussed in class. Students will also participate in the "inside/outside" and "Give One, Get One" activities where they will share and compare ideas, and information, with their fellow classmates. I will also review the students ISP chart to check for understanding**.** Journals will be collected by me and written feedback will be provided. A checklist will be provided to help students create their product and ensure they have included all the necessary criteria. I will review the organizers with the checklist and provide feedback. I will review the Prezi products electronically and then use the same checklist to provide students with feedback. Students will be given the opportunity to use the teacher feedback to make any necessary adjustments.  
  
***Summative:*** Students will use Google Earth to find population statistics and other information about two different countries. They will then use this information to create a Prezi presentation that compares and contrasts the two countries data. This comparison must include an analysis of the statistical data about two countries. For example: how many times bigger the population (or other figure) of one country is than the other? (Checklist will detail exact specification. Students will use their graphic organizers to collect information about their assigned counties to help them create their product. Students must cite their sources  
  
***Rationale:*** A variety of assessment forms are used throughout this lesson. These assessments provide opportunities for both the teacher to check for understanding, and allow the students to assess their own work and levels of understanding.  
  
  
***Standard 7* - *Planning Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.***  
  
***Content Knowledge:*** Students will know how to chooses units of appropriate measurement when converting data, generated by technology, into scientific notation  
  
**Common Core State Standards**  
**Content Area:** Mathematics  
**Grade Level:** Grade 8  
**Domain:** *Expressions and Equations*  
**Cluster:** *Work with radicals and integer exponents.*  
**Standard:** *Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.*  
  
***Facet:*** *Organize*  
  
***Rationale:*** Students will be able to analyze data that contains scientific notation.  
  
***Standard 8 -* *Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.***  
  
***MI Strategies:***  
  
**Verbal:** When creating their Prezis students must provide written information about the country they are researching, and carefully cite any sources used.  
**Logic:** Students will be using their knowledge of scientific notation and relating to the real world.  
**Visual:** Students will be given the opportunity to explore the "scale of the universe" hook. This in an interactive model, with tons of visuals that detail the size of each object, with the measurements expressed in scientific notation.  
**Kinesthetic:** The "Give One, Get One" activity provides students with the opportunity to move around the class and ask questions with purpose.  
**Interpersonal:** Students will work in teams to compare and contrast their countries. After which they must work to create their Prezi.  
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***Type II Technology:***  
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***Rationale:***  
This lesson is designed to meet the needs of seven of the 8 multiple intelligences in a meaningful and engaging way. Journaling, with its reflective components, meet the needs of both verbal and intrapersonal intelligences. The "Give One, Get One" activity provides kinesthetic learners with an opportunity to move around the room and engage with classmates. Partner work provides interpersonal learners with the opportunity to engage with their peers. The logical structure and sequence incorporated throughout the exploration of the content appeals to logical students. While the hook, with its exploration of life in our universe, addresses the interests of naturalistic students.  
  
  
***NETS STANDARDS FOR TEACHERS***  
**1. Facilitates and Inspire Student Learning and Creativity. Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.**  
a. Promote, support, and model creative and innovative thinking and inventiveness  
  
b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources  
  
c. Promote student reflection using collaborative tools to reveal and clarify students’ conceptual understanding and thinking, planning, and creative processes  
  
d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments  
  
***Rationale:*** In this lesson, students will be exploring real world applications of scientific notation as they research, then compare and contrast, data about different countries. Students will also be sharing their ideas with classmates, and working in pairs to create a Prezi that showcases their findings.   
  
**2. Design and Develop Digital Age Learning Experiences and Assessments. Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop knowledge, skills, and attitudes identified in the NETS-S.**  
a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity  
  
b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress  
  
c. Customize and personalize learning activities to address students’ diverse learning styles, working strategies, and abilities using digital tools and resources  
  
d. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching  
  
***Rationale:*** Through the use of Prezi and Google Earth, students are provided with the opportunity to explore and utilize a type II technology as a means to demonstrate their learning in a valid and creative way.